On the 7th the wind reached a velocity of 60 miles an hour at Columbus, 40 miles an hour at Sandusky, and 70 miles an hour at Toledo. Much damage was done in the northern counties to telegraph and telephone wires, buildings, and trees. It was reported to be one of the most severe April storms for many years on Lake Erie.

Thunderstorms were general on the 21st and were accompanied by high winds at most places. A maximum wind velocity of 54 miles an hour was recorded at Columbus, with an extreme velocity of 68 miles an hour for one minute. At Cleveland on this date the wind attained the hurricane velocity of 66 miles an hour from 12:33 to 12:38 p. m., and of 84 miles an hour for one minute at 12:34 p. m.

This storm had many of the characteristics of a tornado in the northern portion of the State, except that no funnel-shaped cloud was observed. At Berea, in western Cuyahoga County, however, the cloud was described as a rolling or tumbling cloud. The path of greatest damage, so far as reports to this office show, was from Crawford County northeastward to Lake County. The high wind was reported in Crawford County at 11:30 a. m., in Lorain County at 12 m., in western Cuyahoga County at 12:15 p. m., at Cleveland at 12:33 p. m., and in Lake County at 1:30 p. m.

In most places the trees, buildings, etc., were blown directly toward the northeast, the path of greatest damage was wider than is usually made by a tornado, and there were other indications that the wind was a straight-line squall wind rather than a true tornado. At Berea, however, houses on the south side of the path of greatest damage were blown first toward the north and then toward the northeast. At Olmsted Falls, also, some of the damaged stones in a cemetery were blown toward the north and others toward the east. These facts indicate the rotary winds that accompany a true tornado.

A great deal of damage occurred in this storm, especially in Cleveland, where it was estimated to be over $1,000,000. Four people were killed in this city and many others were injured. [See details on page 153.]

High winds were general in the southern and western portions of the State on the night of the 29th. At Sidney, in Shelby County, a conservative estimate places the loss at $60,000. The path of greatest damage in this city was only from 150 to 200 feet in width, and there were other evidences of a true tornado. Several eye witnesses state that the cloud looked like gigantic rolling pins or "sea-wheels." The storm there was from 11:45 p. m. to midnight.—*J. W. Smith.*

SNOWFALLS AND WATER EQUIVALENTS IN NEW YORK.

In the MONTHLY WEATHER REVIEW for January, 1907, p. 11, Mr. Robert E. Horton,[1] resident engineer of the New York State Barge-canal Office, voiced the desirability of securing special snowfall measurements and determinations of true water equivalents, pointing out statistically that the measured winter runoff of the West Canada Creek Basin (Mohawk System), always exceeded the measured precipitation of that basin for the same season. He had already established stations designed to correct this discrepancy, and we are glad to present in the following table the results of these accurate snowfall measurements and water equivalents as recorded at Hoffmeister during the winters from 1905 to 1908, under his direction. In his letter of June 4, 1909, Mr. Horton describes Hoffmeister as being one of the localities where the snowfall is deepest.—*H. C. F.*

[1]For other papers bearing on the relation between snowfall and winter stream discharge in the Adirondacks, see Monthly Weather Review, May, 1905, 33:196-202, and January, 1907, 35:8-11.

TABLE 1.—*Showing water equivalent of accumulated snow on ground at Hoffmeister, West Canada Creek Drainage Basin.*

Winter of 1905–6.			Winter of 1906–7.		
Date.	Snow on ground.	Water equivalent.	Date.	Snow on ground.	Water equivalent.
1906.	*Inches.*	*Inches.*	1906.	*Inches.*	*Inches.*
January 7	14.5	3.2	December 10	2.0	0.42
14	20.5	4.0	17	3.0	0.65
21	25.0	4.9	24	3.5	0.70
28	15.0	4.9	30	4.0	0.75
February 4	18.0	6.0*	1907.		
12	30.0	6.6*	January 7	3.0	0.55
18	23.0	7.6*	14	7.0	0.60
25	15.0	5.0*	21	6.0	0.49
March 4	19.0	7.5	28	12.0	4.4
11	17.0	8.0	February 4	20.0	7.4
18	21.0	8.2	11	22.0	4.5
25	31.0	15.0	18	29.0	4.7
April 2	26.0	8.0	25	34.0	4.9
9	22.0	7.4	March 4	37.0	5.0
16	17.0	6.6	5	38.0	4.7
23	0.0	0.0	11	37.0	5.3
			18	32.0	5.7
			24	24.0	7.4
			April 1	14.0	4.2
			8	10.0	4.2
			15	13.5	5.6
			22	13.0	5.7
			29	8.0	4.4

Winter of 1907–8.			Winter of 1908–9.		
1907.			1908.		
December 2	11.0	1.5	November 30	0.0	0.0
9	10.0	1.8	December 7	11.0	2.2
16	12.0	2.7	14	17.0	2.3
23	15.0	3.4	21	23.0	2.4
30	11.5	3.1	28	22.0	5.5
1908.			1909.		
January 6	21.0	3.6	January 4	27.5	6.7
13	23.5	3.8	11	19.0	5.6
20	26.5	4.5	18	38.0	6.7
27	27.0	4.8	25	26.5	8.2
February 3	42.0	4.3	February 1	32.0	6.8
10	58.0	6.0	8	27.0	4.9
17	35.0	7.2	15	30.0	8.6
24	40.0	8.1	22	32.0	9.1
March 2	48.0	9.6	March 1	34.5	11.3
9	52.0	7.0	8	39.0	9.3
16	42.5	11.5	15	43.0	9.6
23	43.0	6.7	22	46.0	11.1
30	28.5	6.0	29	54.0	12.0
April 6	30.0	9.6	April 5	48.0	8.3
13	25.5	7.1	12	42.0	9.5
20	20.0	8.7	19	26.0	6.3
27	9.0	3.6	26	15.0	5.2
May 4	0.0	0.0			

* These figures were obtained by dividing the snow accumulation by 3.0, the snow sample not having been melted by the observer in these cases.—*R. E. H.*

TORNADO IN ILLINOIS.

At 5:40 to 5:45 a. m., April 6, a tornado visited Marion and Halfway, Williamson County, Ill., doing about $8,000 damage, but without causing any injuries to persons in its path. The storm occurred at Marion at 5:40 a. m., but the destructive tip of the funnel-shaped cloud was 50 to 100 feet above the earth, so the damage was mostly to roofs and the upper stories of buildings. The width of the path here is put at 100 to 200 yards. At 5:45 a. m. the storm had reached Halfway, about 15 miles to the northeast. Here the observer reports that there was a well-defined funnel-shaped cloud 30 to 40 feet in diameter, but that most of the damage was done by a straight wind which accompanied the whirl.—*C. A., jr,*

TORNADOES IN KANSAS.

A severe tornado occurred near the border of Cowley and Butler counties on the 28th. It was first noted at 6:05 p. m. 1 mile west of Udall, in the northwest part of Cowley County, and was moving northeastward. At about 6:15 p. m. it struck Douglas, about 11 miles northeast of Udall, in the southern part of Butler County, and much damage was done. One person was killed and one badly injured. The damage at Udall is estimated at $14,000 and at Douglas from $25,000 to $40,000.

On the 29th a small tornado struck Cooperative Observer J. Clarence Norton at Moran, Allen County, Kans., while working in a field, at 3:37 p. m. He writes:

The tornado reported by me was a small one and originated 1 mile west of me and did not hit any buildings or trees in its course. It was 50 yards wide, came down out of a fair sky, and when it hit the plowed land the dust rose in such amounts as to make all in its path as dark as night.

It took all my strength to keep it from sucking me off the lister.[1] The terrific wind and suction and ice-cold center of the inky black whirling mass of dust and cornstalks was indeed terrifying, and my team and myself were surely alarmed. The lister was all that held the team down. Half a mile east of here the tornado rose up.

No material damage seems to have been done, and this storm was dissipated before reaching any other person or any buildings.

A tornado occurred in the east-central part of Butler County and passed to the west-central part of Greenwood County, Kans., on February 22, 1909. The storm destroyed about $10,000 worth of property and injured six or eight persons, but so far no deaths have been reported.—*C. A., jr.*

TORNADOES IN TENNESSEE.

[Extract from Monthly Climatological Report, Tennessee Section, April, 1909.]

Violent thunderstorms and tornadoes occurred on the afternoon of April 29 and the night of the 29–30th at many places in Tennessee, in connection with the passage of an area of low atmospheric pressure of unusual depth and extent, the center of which moved from Kansas (7 a. m., 29th) to Michigan (7 a. m., 30th). This low pressure area, or storm center, at 7 a. m. April 29, was the controlling influence in the weather conditions over the entire central portions of the country, from the Rocky Mountains to the Allegheny Mountains. In its south and east quadrants unusually high temperatures prevailed at 7 a. m., with light to brisk southerly winds; but very little rain had fallen, the sky being generally partly cloudy to cloudy. About the center of the low pressure area, in Oklahoma and Kansas, there was a sharp contrast in temperature; for example, at Oklahoma the temperature was 72°, while at Amarillo it was 50°; at Kansas City it was 72°, while at Dodge City it was 48°. West of the center of the low pressure area temperatures were moderately low. The conditions were favorable for thunderstorms and squalls in Tennessee, as was stated in the forecast printed on the weather maps of the morning of April 29.

The first violent winds seem to have occurred about 2 p. m. in Hamilton County. This disturbance apparently moved northeastward and reached the vicinity of Knoxville about 4 p. m.

The most clearly defined and the longest tornado track, see fig. 1, *1*, was made across the State from the extreme southwest corner northeastward to Scott County. This tornado came from Mississippi, struck White Haven, Shelby County, Tenn., at 7:30 p. m.; struck a section a few miles east of Somerville, Fayette County, at about 8:30 p. m.; vicinity of Henderson, Chester County, about 9 p. m.; vicinity of Centerville, Hickman County, about 10:30 p. m.; Hillsboro and Franklin, Williamson County, about 11 p. m.; Algood and Cookeville, Putnam County, about 1 a. m. (30th). The width of this track varied from a few hundred yards to about one mile.

A second well defined tornado track, see fig. 1, *2*, extended from the vicinity of Cuba, Shelby County, northeastward through Haywood, Gibson, Carroll, Humphreys, Dickson, and Montgomery counties. This track was parallel with *1*, and the time of occurrence of the tornado was about the same. Its width varied from about 200 yards to about 2 miles.

A third track, see fig. 1, *3*, extended through Giles and Lincoln counties northeastward, the tornado being apparently dissipated in the mountains. It struck the vicinities of Pulaski, Bryson, and Fayetteville about midnight. Its track was about one-half mile wide as it passed through the southern part of Giles County.

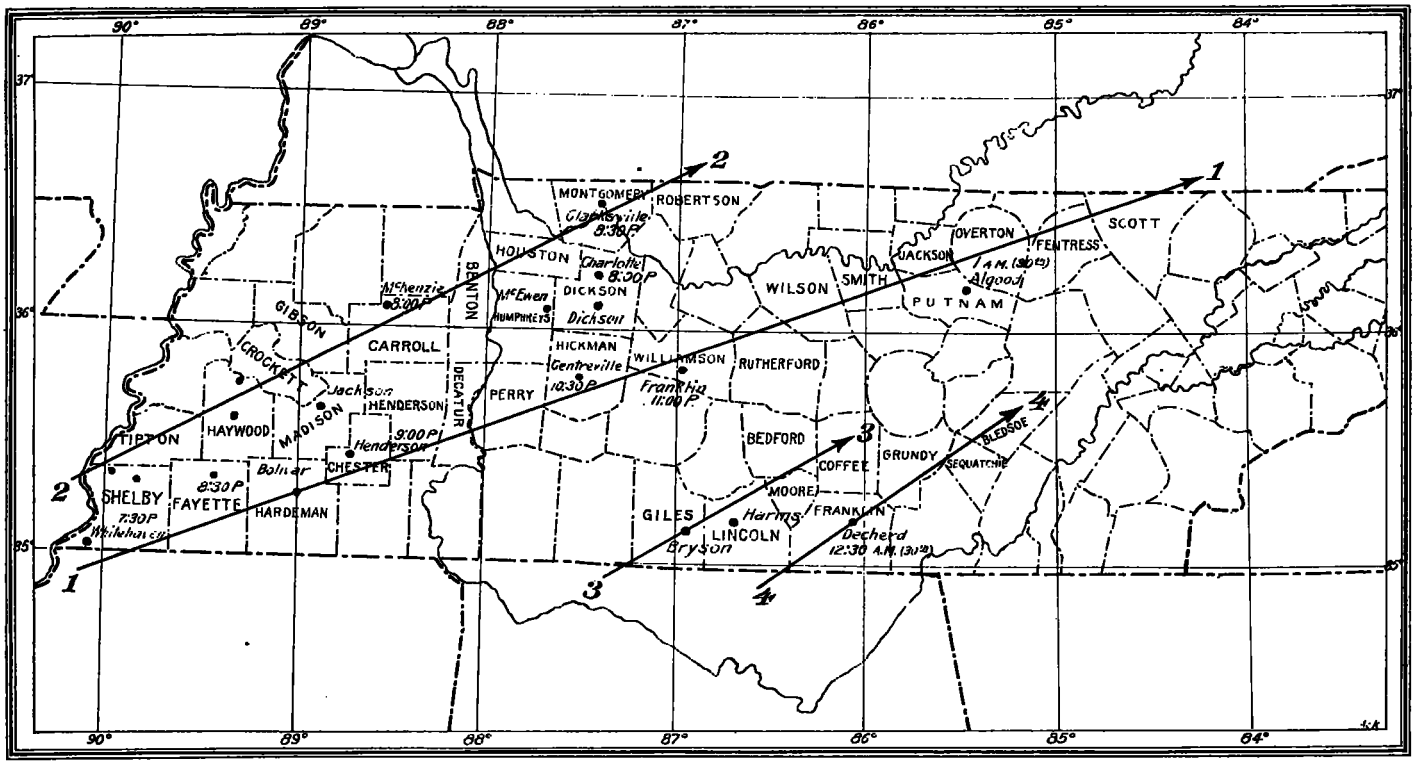

FIG. 1.—Tornado paths across Tennessee, April 29, 1909.

[1] A special kind of plow having a double mould board.